regions on the continent, and especially a region where phthisis and other lung diseases were unknown, and while I grant that phthisis is rare among the indigenes, yet in my practice of only two years in New Mexico I have seen several undoubted cases, and I believe that any physician who has practised medicine in this region will agree with me in stating that pneumonia, bronchitis, and throat diseases, and also rheumatism and typhoid fever, are not only exceedingly prevalent even among the native inhabitats, but are also attended with a very high death-rate. How much of this sickness and mortality is due to climatic influence and how much to their manner of life is yet an open question and one not so easy to answer, and while I believe that imperfect oxidation of the blood acts as a constant and unavoidable source of disease, yet it must be recollected that all the dwellings in this country are made of sun-dried bricks (adobes), and all are more or less damp, and as to real healthful cleanliness, either of their persons or surroundings, it would seem that such an idea had never entered the minds of the inhabitants.

These remarks are necessarily crude and imperfect, partly from the limited field allowed for observation and partly from absence of any statistics, but I think a sufficient number of cases has been quoted to make it fully apparent that physicians have exercised too little care in sending patients to a country they know nothing about, and that thereby they have brought discredit upon themselves and the profession at large, and have caused the loss of many valuable lives.

Fort Union, N. M., March 7, 1876.

Art. IX.—*On Spasm of the Heart, as a Cause of sudden Death, and its Relation to Angina Pectoris.* By Frederick D. Lente, M.D.

C. B., aged 35 years, station agent of the H. R. R. Rd. Co., at Cold Spring, was taken sick about the eighth of April, 1875, and sent for me on the 10th. I diagnosed mild typhoid fever. He was never sufficiently ill to keep his bed all day, and had some relish for food all the time. Temp. 102° to 103°; pulse but slightly accelerated; bowels natural. He had a slight hacking cough almost from the first. After the lapse of a fortnight, his fever subsided, but he was quite feeble, and found that he had lost eighteen pounds in weight. He went out before it was prudent to do so, visited a sick brother in the city, returned the same day, and for two days endeavoured to attend to business. He had a relapse; the fever assuming the same mild course. Temp. 102°–103°. The cough was more annoying, and a mild anodyne expectorant mixture was prescribed. This was all the medication, except one mild cathartic and a simple tonic at the time of his relapse, when his appetite totally failed. This restored it to some extent, and he acquired some relish for his food.

May 3d, his wife informed me that he had a sudden attack in the afternoon. He had taken a little milk-punch, while sitting up in his chair, in the sitting-room, and immediately complained of faintness and dyspnœa, and desired the windows to be thrown open; which was done. When I made my next visit, and the attack was mentioned, finding him doing as well as usual, I attributed it to nervousness and excitement, as his child lay very ill with meningitis in the next room, and his mind was harassed by other cares and annoyances. In consequence of the continued cough, and his wife's uneasiness about it, I made two thorough examinations of his chest, and found nothing abnormal. Dr. Murdock did the same, our last examination being on the 4th, the day preceding his death.

On the 5th, at 7 o'clock A. M., was called to him and found him dead. I suggested a coroner's inquest and an autopsy; and the suggestion meeting with approval, the examination was made at 3 o'clock P. M. by B. D. Taylor, M.D., U. S. Army, assisted by Dr. Murdock, and superintended by myself.

Surface pale, rigor mortis perfect; extremities cold to near the trunk; abdomen warm. Temp. in axilla 88°.

Abdomen. On slitting up the *ileum* Peyer's plates were seen to be moderately enlarged, and one or two small ulcerations partly healed. The *liver* natural, except a slight congestion; *kidneys* the same, the left being decidedly enlarged. Stomach healthy; *spleen* small.

Thorax. *Lungs* perfectly normal. But little fluid in the pericardium. *Heart* small, and *very pale.* Considerable fatty deposit. Cavities entirely empty, no clot, no fluid, no stain; valves and muscular structure healthy.

Head. Nothing worthy of note. *Spine* not examined.

Now, what did the autopsy warrant us in saying to the Coroner, when asked by him "what is the cause of death?" Taken by itself, no very obvious cause. We all remarked the peculiar shrunken and anæmic appearance of the heart, and spasm was at once suggested as a probable cause of death. While the autopsy was being continued, I proceeded to inquire more fully, of the wife, into the nature of the attack thirty-six hours before death, and which I had heretofore considered as of little importance. She stated that *he was very faint, his countenance anxious and deathly pale, his lips blue, his hands pale and shrunken.* The evidence of spasm of the heart was now sufficiently clear to warrant an opinion as to the cause of death, and the verdict of the Coroner was in accordance with this.

At about this stage, the father of the deceased arrived, and stated that at the age of 22 years, his brother was suffering from typhoid fever at Hudson, N. Y., and at the end of four weeks was prônounced convalescent, though very weak. While the doctor was announcing this opinion in an adjoining room, they heard a peculiar sound, and on re-entering the sick-chamber, found the patient dead. He further stated that, at the age of 42 years, his mother died suddenly, when apparently in good health, and while conversing with him.

Dr. Ainsworth of the Army, late of the resident staff of Bellevue Hospital, now stationed at the Military Academy, relates, from memory, the following particulars of a similar case, which occurred in his division.

The woman was found dead in her bed, at the morning round in what was then Ward 24. The nurse could give no history of the case other than that she had been brought into the ward during the previous night, complaining of pain in the abdomen, and nausea. Her symptoms did not seem to be sufficiently severe to justify the calling of the doctor at that hour, and she was not therefore seen by any physician.

I made the autopsy three hours after the discovery of her death. The encephalon was normal. The abdominal and pelvic viscera, though very carefully examined, showed no signs of disease except a slight congestion of one kidney. The great vessels, both of chest and abdomen, presented no signs of disease. The lungs perfectly healthy. The condition of the *heart* was specially striking, and afforded the only clue to the cause of death. The tissue of the heart and of its enveloping membrane was perfectly sound, but the heart itself was *firmly contracted*, and its cavities all completely emptied of blood; nor were there any of the usual clots. In fact, if the heart had been opened and cleaned of its contained blood, it could not have been freer of that fluid than it was at the autopsy.

The literature of "spasm of the heart" is exceedingly meagre; in fact, at the present day, it seems hardly to be recognized as a pathological entity. Dr. A. Flint, in answer to a letter of inquiry on the subject, says: "I cannot furnish you, from my own experience, any case of sudden death fairly attributable to spasm of the heart. I suppose that, in cases of sudden death due to suspension of the heart's action, the condition is generally paralysis from distension, or arrest of action through the *par vagum*. Aside from the experiments relating to the action on the heart of digitalis in poisonous doses, I cannot, at this moment, refer to literature bearing on the subject." Dr. Alonzo Clark says, in answer to a like inquiry, "I cannot aid you much in your inquiry regarding spasm of the heart. In post-mortem examinations, it is not uncommon to find the heart contracted and empty. But I have not been led to regard this as anything more than a natural contraction, the last act of life. In certain cases of tetanus, during a spasm, I have listened for the heart's sounds, and, for a few seconds, have found it silent and pulseless (perhaps in spasm). I have, once or twice, noticed the same thing after poisonous doses of strychnia. I do not know that anybody has written upon the subject."

Until after the occurrence of the case which led me to investigate the subject, I had also forgotten that Heberden and Latham discuss spasm of the heart in its relation to angina pectoris; and lately,[1] Dr. Osgood has extensively referred to the opinions of various authors on the pathology of angina, and incidentally to the conflicting opinions as to spasm, in common with other alleged causes of this singular disease. Latham says "there is a form of dyspnœa, which, from its suddenness, its severity, and the pain of approaching death which attends it, is apt to be confounded with angina pectoris. From what I read in books, and from what I hear in my intercourse with medical men, I suspect that they both pass popularly for the same thing. But it is most needful that our ideas of each should be kept separate." The two, he says, are naturally distinct, though one may be complicated with the other. It will be observed that my patient complained of a recurring dyspnœa of a severe but transient character. (He had complained, as I afterwards discovered, to a friend, of attacks of difficult breathing and distress, for two or three weeks); and the severe attack, preceding his fatal one by thirty-six hours, was characterized by urgent dyspnœa. His anxiety about his sick child, and other matters, which were weighing heavily upon him, prevented him probably from complaining to me of a symptom which did not chance to occur during my visits. The obscurity involving the pathology of these cases, whether we call them *angina* or by whatever term, and the startling fact that a man, apparently in perfect health, and, indeed, known to be free from organic disease, may, in a few days, or in a few minutes even, die from it, naturally makes us eager to seize upon any fact which may lead us to an explanation of the immediate cause of death in some at least of the cases. I, therefore, feel justified in quoting a few of what Latham calls "the sad and interesting particulars" of a case under the care of Dr. Bucknill. "Up to within a very few hours before his (the patient's) death, both body and mind seemed equally to give proof and promise of health. He still took his accustomed pleasure and refreshment in strenuous exercise. His thoughts were still busily employed upon the highest subjects, conceiving and composing with perfect ease, rapidity, and power. He retired to rest at midnight, June 11, 1842, feeling and believing himself to be in perfect health." Yet within three hours after, he was dead. Dr. Bucknill states that, when he entered the room, the patient was almost free from the terrible pain from which he had suffered, was perfectly calm and collected. He conversed freely, and yet his pulse could scarcely be felt. Under stimulants externally and internally, the cold extremities became warm, and the pulse "natural." "He asked me again," says Dr. Bucknill, "what the pain was." "I told him I believed it to be spasm of the heart." He said, in answer to a question, "Yes, my father died of disease of the heart." He then asked many pertinent questions with regard to the causes and consequences of disease of the heart. The pain would then seize him with great intensity, and then suddenly disappear. In one of these paroxysms he died; the pulse ceasing before respiration. The autopsy, as usual, revealed nothing which could explain the sudden accession of the symptoms, and the sudden death. The heart was rather large, the muscular structure was extremely attenuated. It is a noticeable fact that the heart was very *flaccid* and *flat*. It contained but little blood, and that fluid. There were no coagula of any kind in it. Now, let us ask, what more likely to produce such symptoms than *spasm*? What other condition would be competent to produce them? But the condition of the heart (post-mortem) was not such as we *usually* find in spasm. Can the heart, after death from its spasm, relax? No one can answer positively. In this case, the autopsy was made forty-eight hours after death, in very hot weather, and decomposition was well advanced. It is very probable that such a heart would, under these circumstances, relax.

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[1] Am. Journ. Med. Sci., Oct. 1875.

But death may probably occur from spasm of the heart, and yet the cavities contain a considerable amount of blood; that is, there may be *degrees* of spasm of this organ as of other muscles; the highest degree producing death, as we have seen, instantaneously, when the heart will be found empty and contracted, if examined soon after death. A less degree will produce such a spasm as will arrest action more or less completely, and the patient may recover or die. If he dies, the cavities will be found containing more or less blood. And the symptoms will be those of anæmia of the brain. This "retardation and accumulation of blood in the cavities of the heart" Parry refers to *syncope*, and the latter to *diminished energy* of the heart, caused by organic disease. He therefore calls the disease "syncope anginosa." This would be a sort of cardiac paralysis. But, in many cases, there is no organic disease; this point is now well settled; neither has the condition of the patient been such as to lead one to suspect paralysis. They are frequently in good health. Besides, paralysis almost always occurs, even when the patient is greatly debilitated, only on his making some exertion, slight though it may be, generally on attempting to assume the erect or sitting posture, as in diphtheria and pneumonia, etc. And, in these cases, no pain is complained of, nor would we expect actual pain from paralysis. The death is generally too sudden for any intelligible expression; but if any, it is a feeling of intense exhaustion. Flint[1] seems to deny the existence of *degrees* of spasm, as he thinks that "a spasmodic condition of the heart sufficient to occasion such prolonged as well as intense pain would be incompatible with life." But the pain is not so very prolonged, but recurrent, as in the case just narrated, in which also the almost static condition of the heart was indicated by the pulse ("could scarcely be felt"). Latham[2] asks "what, then, is its real nature?" "Dr. Heberden," he says, "reports, after vast clinical experience of the disease, 'that it seems to pertain to *distension*,' and that he evidently meant by 'distension' what we understand by *spasm*." I believe it is Prof. Wm. H. Thomson's idea that some poisons, like aconite, veratria, etc., and also shock, kill by spasm of the heart; the heart not closing its cavities completely, but partially, so as not to allow of sufficient dilatation, and thus inducing anæmia. The remedy he considers to be opium. Dr. Alonzo Clark reported a case of aconite poisoning, in which, all other remedies failing, he injected morphia subcutaneously, and saved the patient.

The writer had a case more sudden, in some respects, than Dr. Bucknill's, in the person of a lawyer, forty years of age, and in fair health, though he had had one or two moderate attacks before the fatal one. He had suffered from rheumatism, but no disease of the valves existed. Yet he died in great agony before I could reach him, though not far away, and summoned at once. No structural disease was discovered at the autopsy. It was many years ago, and I cannot remember the condition of the cavities as to containing blood, or whether contracted or distended.

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[1] Diseases of the Heart.

[2] Diseases of the Heart.

It may be objected, that had my patient, C. B., died of a painful disease like spasm of the heart, he would have given some evidence of a struggle, or made some noise sufficient to rouse those near him. No one was very near him; but spasm may kill instantly and quietly, as in the following case from Latham:—[1]

R. P., about 55 years, was in the enjoyment of his wonted health, when, one day, after his morning's shooting, without any extraordinary fatigue or exertion, he felt, at dinner, an unusual pain in the region of the heart. He retired into his library, and the pain soon ceased. He then begged to be left alone until tea-time. In less than an hour his wife returned into the room, and found him lying upon the sofa just in the position she had left him. She believed him asleep, but found him dead. "The autopsy revealed nothing that could account for his death but a thin, fat heart." Here pain was the sole symptom, and it is presumable, as Dr. Latham says, that it proceeded from spasm of the heart, for we know of no other cause. Neuralgia, of itself, would not cause death.

Although writers are not disposed to admit spasm of the heart as a cause of death, they frequently afford evidence unintentionally of the fact, and also incidentally admit its possibility. In his late treatise on "Electricity in Nervous Diseases," Dr. F. Fieber, of Vienna, in speaking of the efficacy of galvanism in different spasmodic affections, enumerates "spasms of the heart" (proceeding from the cardiac plexus) as one of these. Dr. Stokes (*Diseases of the Heart*) says: "Little as is known of spasm of the heart, that little is opposed to the idea of angina pectoris being caused by it." But in a note to the chapter on "Rupture of the Heart," he remarks: "The same observer (Prof. Smith) has found the heart in tetanus not only so firmly contracted as to cause obliteration of the cavity of the left ventricle, but twisted on itself so as to present a spiral condition, from the extreme contraction of the oblique muscular fibres." A precisely similar condition has been found in the hearts of reptiles poisoned by digitalis. (H. C. Wood, Jr.)

There can be no question as to the cause of death in such cases as the above. In some important and interesting experiments conducted by Drs. Taylor and Lauder Brunton, about eighteen months ago, on the effects of the venom of different serpents, they found, says Weir Mitchell, that "in rare cases the death was by spasm of the heart, but that it was usually due to paralysis of centres."

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[1] Lectures on Subjects connected with Clinical Medicine, by P. M. Latham.

It is a significant fact that, in four out of five cases of *angina pectoris*, reported by Dr. Osgood, of Philadelphia, in the number of this Journal for October, 1875, it is noted that the *left* radial pulse was much smaller than the right, sometimes altogether obliterated. In the remaining cases he does not state whether it was so or not. In none of the cases was there any organic disease discoverable except a fatty degeneration in one. In these cases the painful sensations were all on the *left* side. "This condition of things" (the different size of the arteries) "led me to suspect," says Dr. Osgood, "vaso-motor spasm in the left arm." Nothnagel recognizes spasm of the heart as the cause of angina pectoris, but thinks it secondary to arterial spasm. Dr. Osgood's cases would seem to strengthen the probability of this view.

The effect of nitrite of amyl, far beyond that of any other remedy, in relieving the paroxysms of angina, seems to point to *spasm* as its usual cause. It has been very generally successful, and I am in the habit of advising my patients to keep it by them all the time; and the little glass globules or capsules in which it is now put up in doses, are very convenient. Dr. Osgood found it the only reliable and prompt remedy in his cases. The paroxysms of epilepsy are due to a spasm of the cerebral arteries, and are arrested at once, if sufficient warning is given, by this drug; so in spasmodic asthma.

In all the cases of angina recorded by Dr. Latham, and in many of those recorded by others, the heart was soft and flabby, and the coronary arteries generally much diseased. It might be supposed that such hearts would be subject to paralysis rather than to spasm. But, under what circumstances do spasms of other muscles come on? In cholera, the muscles are feeble, and drained of blood. In death from hemorrhage, as in animals bled to death, convulsions usually precede it. "The anemic condition," says Dr. Geo. B. Wood, "strongly predisposes to convulsions." Wolff attributes angina pectoris to "imperfect innervation of the heart." A muscle, then, in a healthy and vigorous condition, is not liable to spasm.

The literature of spasm of the heart being so meagre, I may be pardoned for introducing here a *resumé* of Latham's arguments in favour of its existence as a pathological entity, and its intimate connection with angina pectoris. "Spasm is always accompanied with pain; and pain and spasm, wherever they are, disable the parts which they befall. Colic stops the peristaltic movements of the bowels. Cramp forbids the hands to handle, and the feet to walk. But the heart is a muscle, and its functions flow from its attributes as a muscle. Now, we are in search of something in the heart, which, as the concomitant of pain, may be disabling to its natural functions. This we find in spasm. In its spasm of smaller degree the heart fails to close freely on the blood, and to impel it freely into the arteries. In its spasm of greater degree it fails to impel it altogether." "Herein we discover an adequate explanation of the chief phenomena of angina pectoris. It is a *spasm of the heart.*"

Heberden sums up as follows: "1. It comes on suddenly, and goes suddenly. 2. It has long and complete intermissions. 3. Wine and spirituous drinks, and opium, afford great relief. 4. It is increased by mental agitation. 5. It exists for years without other injury to the health. 6. At first it is not excited by exercise in a carriage or on horseback, as is usually the case with scirrhus or inflammation (organic disease). 7. The pulse is not quickened in the very paroxysm. 8. The paroxysm attacks soon after their first sleep; a frequent event in diseases which proceed from spasm."

Before concluding I will adduce one more instance of death apparently from spasm of the heart, as it indicates that fatal results of anæsthetics may be due to this cause. The case is reported in the May, 1875, number of the *British Medical Journal*, and was under the care of Dr. James Hardee, of Manchester. A delicate boy of sixteen years, in the Manchester Workhouse Infirmary, had had too operations under chloroform, and came near dying in the second. A third simple operation became necessary. Took brandy one ounce, and then four drachms of ether "on a piece of lint placed on a folded towel, and held pretty closely to the face. He inhaled the vapour more quickly than usual. In about four minutes he seemed to be ready for the operation. Immediately after, and before the operation was begun, Dr. Hardee noticed the respiration, which he had been closely watching, suddenly cease; at the same moment an extreme pallor came over the face, and the pupils became suddenly dilated. Mr. Poultney, the house-surgeon, on placing his finger on the radial artery found the pulse imperceptible. All efforts at resuscitation failed. The autopsy showed all the organs healthy. The *cavities* of the heart *quite empty.*"

Although, like angina pectoris, spasm of the heart may occur when the heart is, to all appearance, sound, it may also, like that disease, happen to a heart which is already crippled by organic disease; and partly, perhaps, mainly in consequence of this. Therefore, whether we admit that some of the deaths in angina result from spasm or not, when we know that a heart is the seat of structural change, whether it be muscular, valvular, or arterial, it behooves us to bear in mind, in giving a prognosis, the possibility of sudden death; for as it was formerly quite common for physicians to predict sudden and early death in almost all *organic* cardiac affections, it is now equally common for them to exclude sudden death altogether in their prognosis of these cases.

Dr. Balfour, in his recently published *Clinical Lectures on the Heart*, discusses briefly the relation of spasm of the heart to angina, and does not agree with Latham and Heberden, but inclines to the opinion of Parry, Stokes, and Walshe, that the peculiar symptoms, and death when it occurs, are due to inhibitory paralysis. He refers mainly to cases in which there have been repeated attacks, and the heart, after death, is found flabby and dilated. But he does not allude to such a case as that of C. B., where the heart is in a quite different condition.

SARATOGA SPRINGS, June to Sept., PALATKA, FLA., Nov. to May.

ART. X.—*An Automatic Method of Opening the Eustachian Tube and Airing the Tympanum.* By H. S. SCHELL, M.D., Ophthalmic and Aural Surgeon to St. Mary's Hospital, Philadelphia.

FOR more than a year I have been in the habit of using a method of inflating the tympanum which seems to me to possess some advantages. This method is based upon the fact that during the act of yawning, and especially if the mouth be kept closed, as in a suppressed yawn, a sensation of movement or slight clicking sound will be experienced in the ears.

I generally direct the patient to keep the lips tightly closed, and to draw down the throat and even to separate the jaws slightly, as if trying to yawn without being observed. The effort usually produces the yawn itself, and if, immediately after the long inspiration which accompanies the act, or at the beginning of expiration, the nostrils are closed with the fingers, air will be felt to fill the tympanic cavities.

The tympanum will remain inflated for some time, often uncomfortably if any amount of force has been used, but may be quickly eased by swallowing the saliva once or twice with the mouth shut. The obvious effect of the inflation can be limited to either ear by closing the external meatus of the other tightly with the unoccupied hand.

The *modus operandi* of the process is as follows: In the act of yawning, as observed in a mirror, the base of the tongue is depressed or fixed, the soft palate is elevated or fixed, and the isthmus of the fauces is very much narrowed by the posterior pillars being strongly drawn towards the middle line. From the shape of a broad arch the isthmus faucium shrinks into a slit half an inch wide and the posterior pillars become straight and rigid.

While this narrowing is in progress a clicking sound is heard in the tympanum, evidently owing to the separation of the walls of the tube, and then inflation may be easily performed. It seems from this that the principal, if not the only agent in producing the effect is the palato-pharyngeus muscle through that portion of it which arises from the cartilage of the Eustachian tube, the so-called salpingo-pharyngeus. The salpingo-pharyngeus does not necessarily contract simultaneously with the main portion of the palato-pharyngeus, for I find that in my own person I can voluntarily